

# Electrostatic Spectrometer for Mars Rover Wheel (WES)

Completed Technology Project (2013 - 2014)



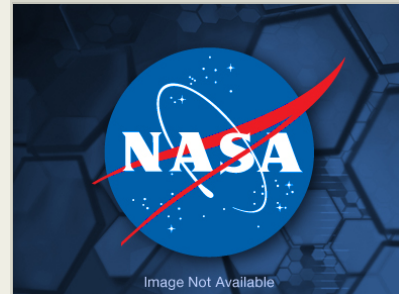
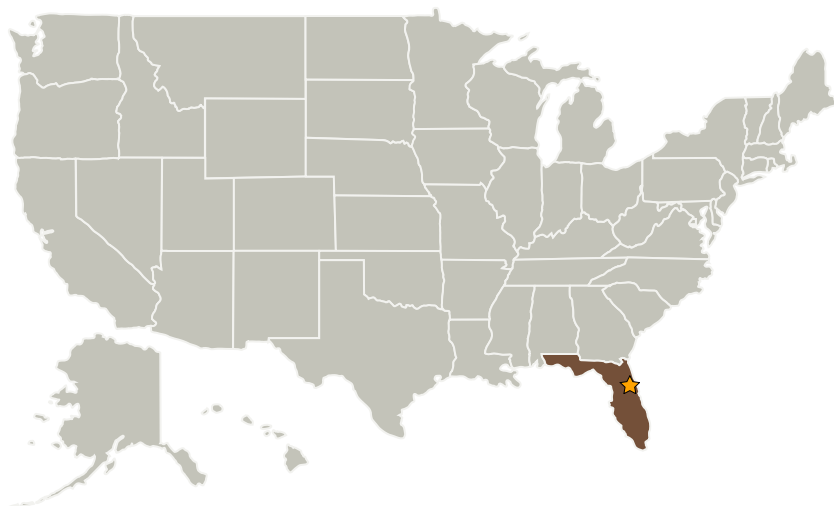
## Project Introduction

Develop a simple electrostatic spectrometer that can be mounted on the wheels of a Mars rover to continuously and unobtrusively determine the mineral composition and water content of the Martian soil. By constantly and passively sampling the soil, we expect that the spectrometer will be able to identify the presence of minerals of interest. Mission scientists can use this information to determine where to stop the rover and deploy the specialized spectrometers that require sample collection, such as the Alpha Particle X-Ray Spectrometer on MSL. Earlier electrostatic sensors developed in our laboratory showed feasibility of differentiating wet and dry Mars simulant. With the proposed sensors, we expect to be able to differentiate minerals by studying the electrostatic spectrum generated.

## Anticipated Benefits

This technology would benefit Mars Sample Return Mission in the mid 2020s. The electrostatic sensors would provide valuable information on the electrostatic properties of the Martian regolith and on the electrostatic properties of space materials in contact with the regolith. The sensors should also determine when the rover is driving over a different type of regolith.

## Primary U.S. Work Locations and Key Partners



Electrostatic Spectrometer for Mars Rover Wheel

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## Organizational Responsibility

### Responsible Mission Directorate:

Mission Support Directorate (MSD)

### Lead Center / Facility:

Kennedy Space Center (KSC)

### Responsible Program:

Center Independent Research & Development: KSC IRAD

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Organizations Performing Work	Role	Type	Location
★ Kennedy Space Center(KSC)	Lead Organization	NASA Center	Kennedy Space Center, Florida
Appalachian State University	Supporting Organization	Academia	Boone, North Carolina

## Primary U.S. Work Locations

Florida

## Links

A feasibility study of the Wheel Electrostatic Spectrometer  
([http://www.electrostatics.org/images/ESA\\_2014\\_A\\_Johansen\\_et\\_al.pdf](http://www.electrostatics.org/images/ESA_2014_A_Johansen_et_al.pdf))

## Project Management

**Program Manager:**

Barbara L Brown

**Project Manager:**

Pamela A Mullenix

**Principal Investigator:**

Michael R Johansen

**Co-Investigators:**

Michael D Hogue

Carlos I Calle

Paul J Mackey

## Technology Areas

**Primary:**

- TX07 Exploration Destination Systems
  - └ TX07.1 In-Situ Resource Utilization
    - └ TX07.1.1 Destination Reconnaissance and Resource Assessment